

ABSTRACT OF THE DISCLOSURE

A digital dye having an optical change resulting from an electrochemical oxidation/reduction reaction is provided for use in a molecular system. The molecular system provides two different colors based on two different oxidation states of at least one digital dye in the molecular system. Further, an optical switch comprising the molecular system configured within an electric field generated by a pair of electrodes is provided, employing the above-described digital dye. Still further, a display device including a transparent display electrode, a counter electrode, and the molecular system disposed therebetween is provided, where the molecular system comprises at least one digital dye.